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Star.	S.—P.	S.—*N.A.*	S.—*B.J.*
ε Pegasi	+0·008	−0·040	
16 Pegasi	+0·008	−0·031	
α Aquarii	−0·006	+0·066	−0·052
θ Aquarii		−0·084	
η Aquarii	+0·028	+0·058	
ζ Pegasi	+0·019	+0·044	
α Pegasi	−0·021	+0·027	−0·039
γ Piscium	+0·016	+0·040	+0·018
π Piscium	−0·010	+0·050	
ι Piscium	−0·002	+0·042	−0·119
ω Piscium	+0·025	+0·006	−0·076

The errors of the press in Professor Gyldén's essay are very numerous; those which I have observed I have corrected, where I have had the means of doing so.

Uppsala, 1875, *May* 1.

On the Proper Motion of the Star in Cetus, marked 793 *in the British Association Catalogue.* By C. Piazzi Smyth, Astronomer Royal for Scotland.

In the course of preparing the forthcoming Edinburgh Catalogue of Stars (intended chiefly to illustrate Proper Motion and facilitate its further observation), the most interesting case that I have yet come across is the small 6·5 mag. star in *Cetus*, numbered 793 in the British Association Catalogue, and otherwise known as Piazzi II. 123; Taylor II. 268; W. 156; and Weisse II. 464.

It is interesting, not only from the proper motion being large in both elements of place, but from its undergoing undoubted variations with time; and also from its catalogue-history having chanced to render it a luminous example of the importance of the modern method of accompanying the one general date of the epoch of any Catalogue by the particular dates of the observations concerned with each star; as well as with the amount of precession and other quantities actually employed in reducing the Stars' places from their dates of observation to the date of the Catalogue.

The place of the star in the B.A.C. for 1850 is,

$$\text{R.A.} = \overset{\text{h}}{2}\ \overset{\text{m}}{27}\ \overset{\text{s}}{51\cdot35} \quad \text{and} \quad \text{N.P.D.} = \overset{\circ}{83}\ \overset{\prime}{50}\ \overset{\prime\prime}{0\cdot2}$$

the former being $0^{\text{s}}\cdot50$ in defect, and the latter $5''\cdot2$ in excess, according to the Edinburgh observations; and the star was

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known to the compilers of the B.A. Catalogue to have a large annual proper motion, being debited by them with no less than $+\ 0^{s}\cdot118$ in R.A., and $-\ 1''\cdot31$ in N.P.D.

Yet these quantities were not large enough; for the Edinburgh observations show that from 1837 to 1867 the mean annual proper motion in R.A. was $+\ 0^{s}\cdot132$, and in N.P.D. $-\ 1''\cdot46$. Curiously enough, too, these quantities go far to justify the much earlier observations of that eminently hard-working astronomer, the late T. Glanville Taylor, who in his *Madras Catalogue* of 1835 gives the R.A. proper motion at $+\ 0^{s}\cdot13$, and the N.P.D. at $-\ 0''\cdot43$ per annum.

Yet the question is by no means merely removed from the B.A.C., and re-established as T. G. Taylor had placed it so many years before; for the most notable peculiarity of the Edinburgh observations is, the undoubted change that has been going on, during their period, in the amount of the proper motion; so that between 1837 and 1851 it was in R.A. at the mean annual rate of $+\ 0^{s}\cdot149$; but between 1851 and 1867 only $+\ 0^{s}\cdot116$.

Similarly, too, the annual proper motion in N.P.D. was between 1837 and 1852 only $-\ 1''\cdot42$, but between 1852 and 1866 it had risen to $-\ 1''\cdot51$, and with symptoms of being still on the increase. To illustrate, therefore, so unusual a case, I have endeavoured in the accompanying table to give, from the Edinburgh observations alone, a first approximation to the successive places of the star, and the amounts of proper motion deduced for each year, from 1837 to 1867; distinguishing all interpolated places by enclosing them in brackets.

Successive Mean Annual Places of the Star in Cetus, B.A.C. 793; *from* 1837 *to* 1867, *from Edinburgh Observations, or Interpolations of the same;* (*single observations in* 1854–57–61–67 *being omitted*).

Date of Obs.	R.A. reduced to Jan. 1 of the year of observation (or interpolation).	No. of Obs.	Annual differences from Observation Curve.	Annual Geometric Precessions computed.	Result for Proper Motion in R.A.
	h m s		s	s	s
1837·90	2 27 8·84	3			
1838	(2 27 12·15)	...	+3·308	+3·156	+0·152
1839	(2 27 15·47)	...	3·312	3·156	0·156
1840	(2 27 18·79)	...	3·313	3·157	0·156
1841	(2 27 22·11)	...	3·314	3·157	0·157
1842	(2 27 25·43)	...	3·313	3·157	0·156
1843	(2 27 28·75)	...	3·313	3·157	0·156
1844	(2 27 32·06)	...	3·312	3·157	0·155
1845	(2 27 35·37)	...	3·311	3·157	0·154

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Date of Obs.	R.A. reduced to Jan. 1 of the year of observation (or interpolation).	No. of Obs.	Annual Differences from Observation Curve.	Annual Geometric Precessions computed.	Result for Proper Motion in R.A.
	h m s		s	s	s
1846	(2 27 38·68)	...	3·308	3·158	0·150
1847	(2 27 41·98)	...	3·305	3·158	0·147
1848	(2 27 45·28)	...	3·300	3·158	0·124
1849	(2 27 48·57)	...	3·296	3·158	0·138
1850	(2 27 51·85)	...	3·292	3·158	0·134
1851·85	2 27 55·12	5	3·286	3·158	0·128
1852·82	2 27 58·39	4	3·281	3·158	0·123
1853	(2 28 1·65)	...	3·277	3·158	0·119
1854	(2 28 4·91)	...	3·275	3·158	0·117
1855·83	2 28 8·17	5	3·273	3·159	0·114
1856	(2 28 11·44)	...	3·273	3·159	0·114
1857	(2 28 14·71)	...	3·274	3·159	0·115
1858·80	2 28 17·99	6	3·275	3·159	0·116
1859	(2 28 21·26)	...	3·276	3·159	0·117
1860	(2 28 24·53)	...	3·277	3·159	0·118
1861·86	2 28 27·80	2	3·278	3.159	0·119
1862·85	2 28 31·07	3	3·279	3·159	0·120
1863·89	2 28 34·38	3	3·280	3·160	0·120
1864	(2 28 37·67)	...	3·280	3·160	0·120
1865·85	2 28 40·96	3	3·280	3·160	0·120
1866·88	2 28 44·23	1	3·279	3·160	0.119
1867·82	2 28 47·50	3	+3·278	+3·160	+0·118

Date of Obs.	N.P.D. reduced to Jan. 1 of the year of observation (or interpolation)	No. of Obs.	Annual Differences from Observation Curve.	Annnal Geometric Precessions computed.	Result for Proper Motion in N.P.D.
	° ′ ″		″	″	″
1837·64	83 53 42·3	3			
1838	(83 53 24·8)	...	−17·55	−16·07	−1.48
1839	(83 53 7·3)	...	−17·55	−16·07	−1·48
1840	(83 52 49·7)	...	−17·54	−16·06	−1·48
1841	(83 52 32·1)	...	−17·54	−16·06	−1·48
1842	(83 52 14·6)	...	−17·	−16·0	−1.48

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Date of Obs.	N.P.D. reduced to Jan. 1 of the year of observation (or interpolation)	No. of Obs.	Annual Differences from Observation Curve.	Annual Geometric Precessions computed.	Result for Proper Motion in N.P.D.
	° ′ ″		″	″	″
1843	(83 51 57·1)	...	−17·52	−16·05	−1·47
1844	(83 51 39·6)	...	−17·51	−16·04	−1·47
1845	(83 51 22·1)	...	−17·50	−16·04	−1·46
1846	(83 51 4·7)	...	−17·48	−16·03	−1·45
1847	(83 50 47·3)	...	−17·47	−16·03	−1·44
1848	(85 50 29·9)	...	−17·46	−16·03	−1·43
1849	(83 50 12·5)	...	−17·45	−16·02	−1·43
1850	(83 49 55·1)	...	−17·44	−16·02	−1·42
1851	(83 49 37·7)	...	−17·44	−16·02	−1·42
1852·83	83 49 20·3	3	−17·43	−16·02	−1·41
1853	(83 49 2·9)	...	−17·42	−16·01	−1·41
1854·81	83 48 45·4	2	−17·42	−16·01	−1·41
1855	(83 48 28·1)	...	−17·43	−16·01	−1·42
1856	(83 48 10·8)	...	−17·44	−16·00	−1·44
1857	(83 47 53·5)	...	−17·46	−16·00	−1·46
1858·81	83 47 36·3	5	−17·48	−16·00	−1·48
1859	(83 47 18·7)	...	−17·50	−15·99	−1·51
1860·84	83 47 1·0	2	−17·54	−15·99	−1·55
1861	(83 46 43·6)	...	−17·58	−15·99	−1·59
1862·85	83 46 26·3	3	−17·62	−15·98	−1·64
1863·88	83 46 8·6	3	−17·64	−15·98	−1·66
1864·90	83 45 51·6	2	−17·67	−15·98	−1·69
1865·86	83 45 33·2	7	−17·70	−15·97	−17·3
1866·87	83 45 15·2	4	−17·72	−15·97	−1·75
1867					

Comparisons with other Standard Catalogues.

The first question that arises on looking over the above Tabular representation of these remarkable proper motions, is, or perhaps should be—"What amount of confirmation do they receive from other Observatories?"

Unfortunately the star has not been observed much of late

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anywhere; but it does happily figure in the new American Catalogue from the Washington Observatory, where all the stars are reduced to the epoch of 1860; and where many other references that I have made to it have proved it to be generally of extreme exactitude. What then was not my consternation on finding, that the Washington place for this star differed from the Edinburgh place in the same year by actually $1^{s}\cdot26$ of time in R.A., and $17''\cdot7$ of space in N.P.D.! Now had there been nothing given by the United States observers but the reduced place of the star and the epoch of their Catalogue, I fear that the Washington result would have had to be thrown overboard; but happily the astronomers there had duly entered that the date of observation was 1870·9, and that the precession they employed in bringing it up to 1860 was in R.A. $+1^{s}\cdot16$, and N.P.D. $-16''\cdot0$,—clearly showing that they had not applied any correction for any amount of proper motion whatever. Multiplying, therefore, the Edinburgh mean annual proper motions for the actual period by 10·9, and applying them to the Washington observations, I had the satisfaction of reducing the R.A. discrepancy from $1^{s}\cdot26$ to $0^{s}\cdot04$, and the N.P.D. discrepancy from $17''\cdot7$ to $0''\cdot8$.

Again the star appears, though in R.A. only, in the Second Radcliffe Catalogue of the Oxford Observatory; for 1860 also, and that Catalogue is generally a very accurate reference too. Yet, in this case, the Radcliffe place differed no less than $1^{s}\cdot71$ from the Washington Catalogue for the same year, and $0^{s}\cdot45$ from the Edinburgh observation of the period. Here again, however, the Radcliffe precession as entered showed that no proper motion had been applied; and instead of the star having been observed 10·9 years after 1860, it had been observed 2·1 years previous thereto.

Making correction accordingly for such amount of proper motion for the interval concerned, the Radcliffe difference from the Edinburgh result is reduced from $0^{s}\cdot45$ to $0^{s}\cdot20$; and if that still should seem a rather large quantity in anyone's eyes, it is probably explainable by the fact of the Radcliffe place depending on a single observation only.

On still further following up the observation-history of the star, we find it in R.A. place in the Greenwich Catalogue for 1840; and in N.P.D. place in the Greenwich Catalogue for 1845. The agreement too of each of these places with the Edinburgh places for the same times, is excellent; that is, within $0^{s}\cdot40$ for R.A. and $0''\cdot3$ for N.P.D.; and the reason is simple, viz., that the Astronomer Royal at Greenwich was aware of the large proper motion, and had applied the correction as given in the B.A. Catalogue. The quantity there is indeed, as already indicated, a trifle too small; but as the difference of time between the Greenwich observations and the dates they were respectively reduced to, for either catalogue, was only 2 years in one case and 1 in the other, such a mere residual difference did not

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amount to any practically sensible quantity during such short intervals.

Altogether, this star's physical movements and human history bear out admirably an earnest remark often indulged in by the late Rev. R. Sheepshanks, to the effect, "that proper motion stars will soon require to be hunted up like planets with continual observations;" and if measure for parallax can be added thereto, we may be already on the eve of new discoveries.

15 *Royal Terrace, Edinburgh,*
1875, 1 *May.*

On the Proper Motion of B.A.C. 793. By Edwin Dunkin, Esq.

The remarkable proper motion of the star B.A.C. 793 (Piazzi II. 123), the apparent variability of which is pointed out in Professor Smyth's paper, has for some time attracted the attention of observers. In 1852 the star was placed on the working star-observing-list at the Royal Observatory, with the express object of obtaining materials for a more accurate determination of its proper motion, and between 1854 and 1858 a large number of observations were made with the transit-circle. Professor Smyth refers to places given in the Greenwich *Twelve-year Catalogue*, where the R.A. is determined from observations made with Troughton's transit-instrument in 1837 and 1838, and the N.P.D. from observations made with the mural-circle in 1845 and 1846, as a proof of accordance of the Edinburgh and Greenwich observations. But he has apparently overlooked the fact that this star appears also in the Greenwich *Six-year Catalogue*, and in the first *Seven-year Catalogue*. In the latter it is credited with the large number of 29 observations in R.A., and 30 in N.P.D., distributed in nearly equal proportion over the years 1854 to 1858.

As an addendum to Professor Smyth's paper, it will be interesting, therefore, to compare the Greenwich observed annual R.A. and N.P.D. of this star with his corresponding observed and interpolated numbers; and although the separate intervals are far too short to determine the value of the proper motion with any great accuracy, we may obtain sufficient evidence to show whether there is a tendency to a variability in the value, similar to that so clearly exhibited in the results from the Edinburgh observations. I have only to remark, that I have extracted the numbers for each year from the Greenwich annual Catalogues, and that the places given are the true observed mean places for January 1 of each year. Each yearly result has been corrected for the new value of the proper motion for the fraction